CLAIMS

1. A polynucleotide which comprises a sequence encoding an HIV envelope protein or fragment or immunogenic derivative thereof, fused to at least one sequence encoding an HIV non-structural or capsid protein or fragment or immunogenic derivative thereof, operably linked to a heterologous promoter.

2. The polynucleotide according to claim 1 wherein the HIV envelope protein is gp120 or a fragment or immunogenic derivative thereof.

3. The polynucleotide according to claim 1 or claim 2 wherein the at least one non-structural or capsid protein or fragment or immunogenic derivative thereof is selected from one or more of Nef, Gag, RT or Tat.

4. The polynucleotide according to claim 3 wherein the gp120 encoding sequence is linked to a sequence encoding HIV RT or a fragment or immunogenic derivative thereof and a sequence encoding HIV Gag or fragment or immunogenic derivative thereof and a sequence encoding HIV Nef or a fragment or immunogenic derivative thereof to encode a gp120, RT, Gag and Nef-containing fusion protein.

5. The polynucleotide according to claim 4 wherein the fusion is selected from gp120-RT-Nef-Gag and RT-Nef-Gag-gp120.

6. The polynucleotide according to claim 3 wherein the gp120 encoding sequence is linked to a sequence encoding HIV Nef or an immunogenic derivative thereof to encode a gp120 and Nef-containing fusion protein.

7. The polynucleotide according to claim 6 wherein the gp120 sequence is further linked to a sequence encoding HIV Tat or a fragment or immunogenic derivative thereof to encode a gp120, Tat and Nef-containing fusion protein.

8. The polynucleotide according to claim 7 encoding a gp120-Nef-Tat fusion.

9. The polynucleotide according to claim 7 further comprising a sequence encoding HIV Gag or a fragment or immunogenic derivative thereof to encode a gp120-Gag-Nef-Tat fusion.

10. The polynucleotide according to any one of claims 3, 4, 5 or 9 wherein the Gag comprises p17 and/or 24.

11. The polynucleotide according to any one of claims 1 to 10 wherein the HIV envelope molecule is substantially non-glycosylated when expressed in a mammalian target cell.

12. The polynucleotide according to claim 11 wherein the HIV envelope molecule lacks a functional secretion signal.

13. The polynucleotide according to any one of claims 1 to 12 wherein one or more of the sequences encoding gp120, Nef, Gag, RT or Tat is or are codon optimised to resemble the codon usage in a highly expressed human gene.

14. A polynucleotide sequence selected from the group:

1. gp120 codon optimised, minus secretion signal – tr Nef
2. gp120 codon optimised, minus secretion signal – tr Nef – mTat
3. gp120 codon optimised, minus secretion signal – Nef - mTat
4. gp120 codon optimised, minus secretion signal – p17/24 Gag – tr Nef
7. gp120 codon optimised, minus secretion signal – p17/24 Gag – tr Nef - mTat
8. gp120 codon optimised, minus secretion signal - p17/24 gag - Nef-mTat
9. gp120 codon optimised, minus secretion signal - p17/24 gag - mNef-mTat
10. gp120 codon optimised, minus secretion signal - p17/24 gag - L1Nef-mTat
11. gp120 codon optimised, minus secretion signal - p17/24 gag - L2Nef-mTat
12. gp120 codon optimised, minus secretion signal - p17/24 gag - LLNef-mTat
13. gp120 codon optimised, minus secretion signal - p17/24 gag - mLLNef-mTat
14. gp120 codon optimised, minus secretion signal - p17/24 gag - mL1Nef-mTat

15. gp120 codon optimised, minus secretion signal - p17/24 gag - mL2Nef-mTat
16. gp120 codon optimised - trNef
17. gp120 codon optimised - trNef-mTat
18. gp120 codon optimised - Nef-mTat
19. Nef-mTat- gp120 codon optimised
20. trNef-mTat- gp120 codon optimised
21. gp120 codon optimised - p17/24 Gag – tr Nef
22. gp120 codon optimised – p17/24 Gag – tr Nef-mTat
23. gp120 codon optimised, minus secretion signal – mRT- trNef – p17/24 Gag
24. mRT – trNef – p17/24 Gag – gp120 codon optimised, minum secretion signal

wherein RT and Gag are codon optimised.

15. The polynucleotide according to any one of claims 1 to 14 wherein the promoter is the promoter from HCMV IE gene.

16. The polynucleotide according to claim 15 wherein the 5' untranslated region between the promoter and coding polynucleotide comprises exon 1.

17. A vector comprising a polynucleotide as claimed in any one of claims 1 to 16.

18. The vector according to claim 17 which is a double-stranded DNA plasmid.

19. The vector according to claim 17 which is a replication defective adenovirus vector.

20. The vector according to claim 19 which is derived from Pan 9, 5, 6 or 7.

21. A fusion protein comprising an HIV envelope protein or fragment or immunogenic derivative thereof and at least one additional HIV protein or fragment or immunogenic derivative selected from non-structural or capsid proteins.

22. A fusion protein according to claim 21 wherein the fusion is selected from gp120-RT-Nef-Gag and RT-Nef-Gag-gp120.

23. A polypeptide encoded by the polynucleotide or vector according to any of claims 1 to 20.

24. A pharmaceutical composition comprising a nucleotide sequence according to any one of claims 1 to 16, a vector of any one of claims 17 to 20, a fusion protein of claim 21 or 22 or a polypeptide of claim 23, and a pharmaceutically acceptable excipient, diluent, carrier or adjuvant.

25. The pharmaceutical composition according to claim 24 wherein the carrier is a plurality of particles such as gold beads.

26. The pharmaceutical composition according to claim 24 or 25 for delivery in a prime boost format.

27. An intradermal delivery device comprising a pharmaceutical composition according to any one of claims 24 to 26.

28. A method of treating a patient suffering from or susceptible to a disease comprising administering a safe and effective amount of a pharmaceutical composition according to any one of claims 24 to 26.

29. A polynucleotide or a vector or fusion protein or polypeptide according to any one of claims 1 to 23 for use in medicine.

30. Use of a polynucleotide or a vector or fusion protein or polypeptide according to any one of claims 1 to 23 in the manufacture of a medicament for the treatment of disease.

31. A process for the production of a polynucleotide according to any one of claims 1 to 16 comprising linking a nucleotide sequence encoding an HIV envelope protein or fragment or immunogenic derivative, preferably a non-glycosylated gp120 sequence, and a sequence encoding an HIV non-structural or capsid protein or fragment or immunogenic derivative, to a heterologous promoter sequence.

32. A polynucleotide encoding an HIV Tat molecule or fragment or immunogenic derivative in a fusion with at least two further HIV antigens.

33. The polynucleotide according to claim 32 wherein the two further HIV antigens include gp120 and Nef and optionally Gag and/or RT, or fragments or immunogenic derivatives thereof.

34. A Tat-containing fusion encoded by a polynucleotide according to claim 32 or 33.